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UNIVERSITY OF BAHRAIN COLLEGE OF INFORMATION TECHNOLOGY  
DEPARTMENT OF COMPUTER SCIENCE 1<sup>st</sup> SEMESTER 2013/2014

ITCS 242: ASSEMBLY PROGRAMMING

DATE: NOV 06, 2013

FIRST TEST

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QUESTION ONE: Write a complete assembly program that:

[18 pts]

- Defines an array JIN consisting of 16 elements of signed words.
- Randomly generate 16 words and store the generated values in array JIN.
- Displays in HEX all elements of array JIN as double words separated by a space.
- Store -10 in low-order byte and +12 in high-order byte in each element of array JIN.
- Display the contents of array JIN as signed double words in binary one value per line.

```
INCLUDE Irvine32.inc
.DATA
JIN    SWORD    16 dup(?)
.CODE
MAIN   PROC
CALL   RANDOMIZE
; Generating random numbers and storing them in array JIN
MOV    ESI, OFFSET JIN
MOV    ECX, LENGTHOF JIN
L0:    CALL    RANDOM32
MOV    [ESI], ax
ADD    ESI, 2
LOOP   L0
CALL   CRLF
; Display elements of array JIN as dwords (HEX) separated by space
MOV    ESI, OFFSET JIN
MOV    EBX, TYPE JIN * 2
MOV    ECX, LENGTHOF JIN / 2
CALL   DUMPHEX
CALL   CRLF
; Store -10 in LO byte and +12 in HO byte in each element of JIN
MOV    ESI, 0
MOV    ECX, LENGTHOF JIN
L9:    MOV    JIN[ESI], 0CF6H
ADD    ESI, 2
LOOP   L9
; Display ARRAY JIN as signed dwords in binary ONE VALUE PER LINE
MOV    ECX, LENGTHOF JIN / 2
MOV    ESI, 0
L2:    MOV    EAX, DWORD PTR JIN[ESI]
CALL   WRITEBIN
CALL   CRLF
ADD    ESI, 4
LOOP   L2
CALL   CRLF
EXIT
MAIN   ENDP
END     MAIN
```

**QUESTION TWO:**

{15 points}

Choose the BEST correct answer for each of the following questions and write its letter symbol down in the table shown below

- 1) The .obj files are translated into .exe files by the \_\_\_\_\_ program:  
a) Compiler      b) Assembler      c) Editor      **d) Linker**      e) None
- 2) The register the must be used to store the loop repetition counter when using LOOP instruction is:  
**a) ECX**      b) EBX      c) ESI      d) EIP      e) None
- 3) The register containing the offset address of the next instruction to be executed:  
a) ESI      b) EBX      c) ECX      **d) EIP**      e) None
- 4) The 8-bit value 10001010 represents unsigned decimal value \_\_\_\_\_ and signed decimal value \_\_\_\_\_  
a) -138, 118      **b) 138, -118**      c) 138, -138      d) 118, -118      e) None
- 5) If a PC has 24 data lines and 8GB of main memory, the minimum number of address lines is  
a) 8      **b) 33**      c) 32      d) 64      e) None
- 6) The type of the SOURCE operand used in the instruction: MOV BX, [HI]; is:  
a) Immediate      b) Direct      c) Indexed      **d) indirect**      e) None
- 7) If the physical address is 20000 and the offset value is 39C0, then the segment value will be:  
a) 59C0      b) 239C0      **c) 1C64**      d) 1C640      e) None
- 8) The statement that produces syntax error during assembly process is:  
a) ADD EAX, EBX      b) SUB EAX, 20H      c) XCHG AX, BX  
d) SUB [EBX], AX      **e) None**
- 9) The statement that produces syntax error during assembly process is:  
a) INC AX      b) MOVZX EBX, CL      c) ADD AX, BX  
d) **MOV SX EBX, EAX**      e) MOV DH, 20H
- 10) The statement that produces syntax error during assembly process is:  
a) MOV AX, [EBX]      b) MOVZX EBX, CL      c) INC AX  
d) **MOV [EBX], [EAX]**      e) MOV DH, 20H
- 11) The step in the instruction cycle that determines where to store the result is:  
a) STORE RESULT      **b) INSTRUCTION DECODE**      c) NEXT INSTRUCTION  
d) OPERANDS FETCH      e) None
- 12) The instruction that stores 0 in the memory word pointed by esi register is:  
a) MOV esi, 0      b) MOV [esi], 0      c) SUB [esi], [esi]  
d) SUB esi, esi      **e) None**
- 13) The instruction that subtracts the contents of CX register from the word pointed by ebx register is:  
a) SUB CX, [EBX]      b) SUB ebx, CX      **c) SUB [ebx], CX**  
d) SUB WORD PTR EBX, CX      e) None
- 14) The directive that defines an array OUR consisting of 24 signed bytes all initialized with -50 is:  
**a) OUR sbyte 24 dup(-50)**      b) OUR sdword 24 dup(-50)  
c) OUR SWORD 24 dup(0A0H)      d) OUR sbyte 24 dup("-50")      e) None
- 15) The instruction used to decrement a word variable pointed to by a register ESI is:  
a) DEC ESI      **b) DEC WORD PTR [ESI]**      c) DEC [ESI]  
d) SUB word ptr ESI, 1      e) None

Question #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	D	A	D	B	B	D	C	E	D	D	B	E	C	A	B

**QUESTION THREE:**

{18 points}

- (a) Given two long numbers V1 and V2 each consisting of 64 bytes, write the code needed to swap the contents of V1 and V2. (V1= 231A5C ... 1B789FH, V2= 5F9079 ... CC4477H).

```
MOV     ECX, SIZEOF V1
MOV     EBX, 0
L2: MOV     AL, BYTE PTR V1[EBX]
XCHG    AL, BYTE PTR V2[EBX]
MOV     BYTE PTR V1[EBX], V1
INC     EBX
LOOP    L2
```

Given the following data definitions: UU sdword 64 dup (?)  
sdword 10 dup (?)

- (b) Write **NO more than 7 instructions** to move ALL double words of array UU down in the memory for 10 double words. (Not allowed to change the values in UU).

```
MOV     ECX, LENGTHOF UU
MOV     EBX, SIZEOF UU - 4
L6: MOV     EAX, UU[EBX]
MOV     UU[EBX+40], EAX
SUB     EBX, 4
LOOP    L6
```

- (c) Given: FOO QWORD 12 dup(?); Give the needed instructions to store in a predefined word variable named NEW the sum of all bytes in FOO.

```
MOV     ECX, SIZEOF FOO
LEA     ESI, FOO
MOV     NEW, 0
LG: MOVSB    AX, byte ptr [ESI]
ADD     NEW, AX
INC     ESI
LOOP    LG
```

**QUESTION FOUR:**

[12 pts]

**Carefully study the following Assembly code, and then answer the two parts of question**

```
T1  BYTE    9AH, 22H, 7FH, 9CH, 8 dup(?)
T2  WORD    6F7FH, 6ACAH, 81CFH, 69CFH, 12A8H
UT  DWORD   725A9033H, 56F14BH, 69CB3A2CH, 248F7C39H, ?
FFF  EQU    $-T2

      MOV    DX, WORD PTR T1
      MOV    AX, WORD PTR UT+8
      MOV    BX, WORD PTR UT-3
      MOV    CH, LENGTHOF T1
      MOV    CL, SIZEOF UT
      MOVSX  DI, T1[3]
```

**Part#1:** After executing the above instructions, choose the best for each of the following 5 questions

- 1) The value assigned to the constant name FFF is:  
a) 10                      b) 26                      c) 20                      d) 1EH                      e) None
- 2) The register BX will contain:  
a) C9CFH                      b) A869H                      c) CF12H                      d) 69A8H                      e) None
- 3) The register AX will contain:  
a) 2C3AH                      b) 69CBH                      c) 3A2CH                      d) CB69H                      e) None
- 4) The register CX will contain:  
a) 140CH                      b) 1220H                      c) Undefined                      d) 0C14H                      e) None
- 5) The register DI will contain:  
a) FF9CH                      b) 009CH                      c) 7F9CH                      d) 9C7FH                      e) None

**Part#2:** Answer each of the following 6 questions as required:

- 6) The instruction that creates a pointer to the fourth element in UT is **LEA ESI, UT[12]**
- 7) The instruction that stores in ebx the first 4 bytes of T1 is **MOV EBX, dword ptr T1**
- 8) The instruction that replaces the value in seventh byte in UT with 6A is **MOV byte ptr UT[6], 6AH**
- 9) The instruction that stores in AX the number of bytes of UT is **MOV AX, SIZEOF UT.**
- 10) The instruction that clears the third byte of T1 is **MOV T1[2], 0**
- 11) The two instructions that store in AX the difference between the last two values in T2 are  
**MOV AX, T2[SIZEOF T2-2]**  
**SUB AX, T2[SIZEOF T2-4]**